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NEVADA RANGELAND MONITORING HANDBOOK

A Cooperative Effort by:

Soil Conservation Service, Forest Service,
eau of Land Management, University of Nevada, Reno,
Agricultural Research Service and Range Consultants

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NEVADA RANGELAND MONITORING HANDBOOK

September 1984

First Edition

NEVADA RANGE STUDIES TASK GROUP

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NEVADA RANGELAND MONITORING HANDBOOK
1984

Preface

The Renewable Natural Resources Division, University of Nevada, Reno, extension and research staff conducted a day and a half workshop on June 5-6, 1980 for professional range conservationists, managers, and scientists to review and evaluate available technology for monitoring present and future grazing management in Nevada. Consideration was given to vegetation studies of ecological status, trend, and forage utilization.

The workshop was attended by over 50 people from Nevada and California, all of whom participated in discussing existing procedural problems encountered in the field. The recommendations resulting from these discussions were: (1) that an interagency/consultant task group be formed to evaluate and agree on procedures, and (2) that there should be concurrence on definitions applicable for monitoring rangelands in Nevada. As a result, the Nevada Range Studies Task Group was formed.

The following individuals have served on the Task Group:

Wayne Burkhardt - University of Nevada, Reno
Jim Doughty - USDA Soil Conservation Service
Richard Eckert - USDA Agricultural Research Service
Ken Genz - USDA Forest Service
Brad Hines - USDI Bureau of Land Management
Fenton R. Kay - Nevada Department of Wildlife
Mike Kilpatrick - University of Nevada, Reno
Jim Linebaugh - University of Nevada, Reno and USDA Soil Conservation Service
Lester McKenzie - Private Range Consultant
John McLain - Private Range Consultant (Resource Concepts, Inc.)
Mike Phillips - USDI Bureau of Land Management
Bob Stager - USDI Bureau of Land Management
Sherman Swanson - University of Nevada, Reno
Paul Tueller - University of Nevada, Reno

The monitoring procedures recommended by the Nevada Range Studies Task Group were selected after a review of existing methodologies. The criteria used in deciding on which methods to recommend were that they be low in cost, repeatable, and technically adequate.

This booklet was written to be used by the range manager as a technical guide. The recommended procedures should be considered as a standard approach for monitoring and should not preclude the use of different or additional methods where resource conditions or values dictate.

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INTRODUCTION

Monitoring grazing use on rangelands has become a matter of much interest. With recent emphasis on use of monitoring information as a basis for management of rangeland grazing, it has become necessary for range people to agree on a consistent approach for gathering and using field data. This document is intended to recommend a sound and practical approach for rangeland monitoring in Nevada and is applicable on public and private lands.

Monitoring determines the nature of grazing which has occurred and measures the effectiveness of management in meeting specific objectives. In order for the results of monitoring studies to be useful, it is essential that management objectives be based upon existing resource conditions and issues and be measurable, attainable, and realistic. These objectives and plans to reach them should be arrived at in consultation with and coordination among the land manager, rancher, and other people directly interested in the management areas. They form the basis on which the intensity and types of studies are determined and how the key management areas are selected.

Plans for livestock grazing management should be coordinated with plans for other resource uses on rangelands and should include a monitoring plan tailored to the specific grazing area or allotment. The plan should identify monitoring needs, sampling and observation techniques, transect locations, monitoring responsibilities, schedules for reading and interpreting the studies, and specific evaluation procedures. The data collected should be compiled in a format that is readily and clearly understandable and is kept current with a simple storage and retrieval system. Maps and graphic displays of information such as use patterns and trend data relative to objectives should be readily available when management plans are reviewed.

If possible, the same people, i.e., the livestock operator, range manager, and representatives of other affected interests, who develop management plans should get together and consider monitoring information during the process of reviewing and revising plans. It is also important that these same people participate in field inspection tours and data collection, depending on the agreement arrived at through the planning process.

Base data needed for planning the use of rangeland resources and monitoring includes information on ecological sites and seral stages, along with maps of grazing use patterns over the allotment or pasture as a whole. These are used to develop management objectives, to determine the location of key management areas, to develop grazing plans, and to help decide the need for and location of range improvements. The intensity and type of monitoring studies are then determined.

Monitoring is conducted to find out what is happening and why it is happening in relationship to specific management objectives. This handbook discusses short and long term monitoring and the approaches to each. Short term monitoring documents the nature of grazing use and other important events of recent occurrence. This information is the basis for making seasonal or annual adjustments so that management plans work as intended.

Long term monitoring documents any change in vegetation and soil over time and normally involves permanent study locations in key areas. It documents progress toward soil and vegetation objectives that are identified in the management plan.

A goal should be to implement and maintain monitoring on all active grazing allotments. However, budgetary constraints may preclude attaining this goal and necessitate setting priorities and concentrating efforts on allotments where management changes are needed and/or are being implemented.

The minimum field procedures or methods recommended by the task group include recording actual use, use pattern mapping, measuring key forage plant utilization on key areas, placement of utilization cages, collecting frequency trend data, determining ecological status and/or resource value ratings, noting information on growing conditions, and documentation of other events and observations. Because monitoring is directed at measuring change over time on an allotment and not comparisons among different allotments, it is imperative regardless of what methods are used on a particular study location that the same methods be continued over the years for consistency. These procedures are not designed to fit all situations nor are they meant to be followed in a cookbook fashion. On allotments or pastures where objectives are developed for other resource uses such as fisheries, archaeological sites, or key wildlife and wild horse and burro habitats, it may be necessary to design special or more intensive studies to measure the attainment of these objectives.

KEY MANAGEMENT AREAS AND SPECIES

Proper selection of key management areas is an essential step in developing or establishing a monitoring program. Because it is impractical to measure or sample every part of a grazing unit, one or more key areas are identified. A key area is a relatively small portion of a unit selected because of its location, use, or grazing value as a monitoring point for measuring change in soil and vegetation and the impacts of grazing. It is assumed that key areas, if properly located, will reflect the current grazing management over similar areas in the unit. They should serve as representative samples of range conditions, trends, and seasonal degrees of use and forage production. A key area may be selected where a management problem exists that warrants special attention. This kind of area is termed a critical management area.

Range conservationists, livestock operators, and others who know the range should cooperatively select key areas. Key areas in a unit may change if management significantly changes. Therefore, key areas must be carefully selected and periodically re-evaluated to assure that the overall monitoring results reflect the situation in the unit.

Key forage species, when grazed, serve as indicators of the degree of use of associated species or are those species which must, because of their importance, be considered in the management program. Key species should be abundant on rangelands in satisfactory ecological status and should be plentiful enough to provide an adequate seed source on those in unsatisfactory status. These species generally are preferred by grazing animals although managers may select different plants to monitor management objectives for other resource uses, such as wildlife and watershed. Allotment management objectives are often based on improving or maintaining the health, production, and reproduction of key species. Appendix Number 1 (Page 9) describes the procedures and criteria for selecting key management areas and key species.

ECOLOGICAL SITES

An ecological site is a kind of land with potential for a specific plant community and with specific physical site characteristics. Ecological sites differ in their ability to produce vegetation and respond to management. These sites represent the product of all the environmental factors responsible for their development. The native plant community in an ecological site differs from that of other ecological sites in the kind or proportion of species or in total production.

Ecological site descriptions normally serve as standards of measure for management purposes. Information on ecological sites is very important for setting objectives in rangeland management planning, for selecting key areas, and for tracking progress with monitoring. It is essential that study locations be confined within the boundaries of ecological sites. Sampling locations which include portions of more than one ecological site cannot be interpreted properly. Field people should thoroughly observe the characteristics of vegetation and soils before setting objectives and locating key areas, especially in the absence of described ecological sites.

SHORT TERM MONITORING

Short term monitoring is for documenting the nature of grazing which has occurred and assessing whether grazing use is actually following the plan and meeting short term objectives. It should also document other important events occurring during the year that affect the resources. Observations from short term monitoring may indicate the need for an adjustment in management before long term trend monitoring information is useful. Accumulated short term monitoring data are necessary for interpreting long term monitoring data.

Short term monitoring involves making observations, gathering data and keeping records on distribution patterns, grazing use, problem areas, soil surface conditions, growing conditions, actual use (numbers and kinds of livestock, wild horses and burros, wildlife and dates of use), and observations of other events (e.g., insect infestations, fire, and improvement failures).

Techniques used or types of data collected for short term monitoring include: (1) grazing use records, (2) weather information, (3) use maps, and (4) key forage plant utilization using cages for comparison.

LONG TERM MONITORING

Long term monitoring measures changes in soils and vegetation over time and is used to periodically measure progress toward meeting long term grazing management objectives. Long term studies are usually done at permanent sampling locations in key areas.

Techniques used or types of data collected periodically for long term monitoring include: (1) frequency, (2) percent composition by weight of the vegetation, (3) key forage plant utilization, (4) resource value ratings, (5) photography (photo plots), and (6) evaluation of permanent exclosures.

MONITORING TECHNIQUES AND TYPES OF DATA

Grazing Use Records

Accurate recording of actual grazing use by livestock, wild horses and burros, and wildlife should be maintained by unit or pasture to help make adjustments in management plans. As data are recorded and accumulated, they provide managers accurate information on the season and duration of use and the number, kind, and class of grazing animals that are using and have used pastures of varying sizes. The livestock manager should be primarily responsible for the livestock portion of this record assisted by the range manager. This actual use information is the day-to-day working record of a range livestock operation.

The livestock use record generally takes the form of a pocket herd-book or a diary. Pertinent livestock or range information is recorded and becomes a record of livestock and grazing activities for the year. It contains dates, and numbers of livestock gathered, moved, branded or sorted, as well as death losses and treatment of sick animals; grazing problems such as water or distribution; salting records; forage conditions or other important matters.

Similar records of grazing use by major wildlife species and/or wild horses and burros should be maintained by the range manager where appropriate. Examples of forms that can be used to record actual use data are in Appendix Number 5 (Page 41).

Use Mapping

The use map is one of the most important tools in grazing management and in short term monitoring. It is used to help establish key management areas, to identify distribution problems and solutions, to develop objectives and grazing plans, to locate range improvements, and to make adjustments in management plans.

The utilization map for an allotment or pasture can help range managers determine whether or not the grazing plan is functioning as designed. The map can identify and indicate the relative extent of areas underused, overused, and properly used. Problem areas can be identified for closer study to determine causes and potential solutions.

Making and regularly updating utilization maps is a joint responsibility of range managers and livestock operators. This process helps them become familiar with the allotment. These periodic visits and observations help identify needed adjustments in grazing plans. Adjustments might be in the form of new or relocated water developments, fences or salt grounds, or changing the intensity of grazing by modifying livestock numbers or the period of use.

An approach to use mapping is discussed in Appendix Number 3 (Page 19).

Key Forage Plant Utilization

The key forage plant utilization method is recommended to monitor utilization on key areas. Utilization cages should be employed in conjunction with this method on key areas to help the observer make reliable estimates of the present utilization-by-weight of the key species. It is used in short term monitoring where documented use is needed on key areas in addition to use maps. Practice and experience with this method also helps observers properly recognize the light, moderate, and heavy use classes when doing use mapping. Key forage plant utilization is also used in long term monitoring to help interpret why vegetation and soils changes have taken place. The utilization determined on key areas is used with actual use data, trend, ecological status, use patterns, weather, and/or supplementary information to evaluate whether or not management changes are needed. The key forage plant utilization method is discussed further in Appendix Number 3 (Page 20).

Weather Data

Weather is the most important single factor influencing variation in forage production, and when properly recorded is an essential part of both short and long term monitoring. General observations on growing conditions and any applicable measured weather data should be considered when making changes in grazing use. Monitoring plans may call for gathering information on weather and growing conditions.

The relatively few, widely scattered weather stations in Nevada are used to obtain basic data. These can be supplemented with data from other sources, often closer to range areas being studied. Suggested sources are the Soil Conservation Service, the Forest Service, the Bureau of Land Management, the agricultural experiment stations, and ranchers who maintain records.

Frequency

The Range Studies Task Group recommends that a frequency sampling procedure be used to measure trend in long term monitoring (refer to Appendix Number 4 Page 27 for detailed field procedures). Both a landscape and a closeup photograph should be taken each time a transect is sampled. When frequency transect data indicate a statistically significant change in the frequency of occurrence of the key species, the change is evaluated to see if the specific management objectives for the rangelands represented by the key area are being met.

Ecological Status

Ecological status is use-independent and is defined as the present state of the vegetation and soil protection of an ecological site in relation to the potential natural community[1] for that site. It is an expression of the relative degree to which the kinds, proportions, and amounts of plants in the present plant community resemble that of the potential natural community. It is an ecological rating of the present community. Air dry weight is the unit of measure used to compare the percent composition and production of the present plant community with that of the potential natural community (PNC). The four seral stage classes that relate to the potential natural community are:

Percent of Potential Natural Community by Air Dry Weight	Seral Stage Classes
76 - 100	potential natural community (climax)
51 - 75	late seral
26 - 50	mid seral
0 - 25	early seral

Refer to Appendix Number 2 (Page 13) for a more detailed discussion of ecological status.

The primary purpose of determining ecological status in long term monitoring is to provide a basis for comparing or monitoring the extent and direction of changes in the plant community as a result of specific treatment or management. When establishing key area studies for native plant communities, the ecological status should be determined to facilitate monitoring the accomplishment of specific management objectives.

Resource Value Ratings

Resource value ratings are based on vegetation and soil factors such as species composition, productivity, soil erodibility, and ground cover. Management objectives may be expressed in terms of resource value ratings. A rating change indicates change toward or away from the desired resource value. Resource value ratings are used to relate the vegetation present on an ecological site to a particular use or benefit. They may be established for each plant community capable of being produced on an ecological site, including exotic or cultivated species. Resource value ratings are also useful in long term monitoring of areas such as meadows, riparian communities, woodlands, and where conditions have been altered, such as annual ranges and seedings, to the degree that ecological status is not meaningful for management purposes.

1/ Potential natural community is a biotic community that would become established if all successional sequences were completed without interference by man under present environmental conditions.

Supplemental Techniques and Information

Supplemental information and techniques are helpful and often essential for interpretation and proper use of short and long term monitoring data in making decisions on management changes. Any special conditions or events should be documented. Some of the more useful supplemental information includes:

Apparent Trend -

Apparent trend refers to one time observations of soil and vegetative conditions on rangelands in the absence of or to supplement trend data. It relies on soil and vegetation indicators and can be used as a supplementary management tool. It should only be done by an experienced observer and should always be clearly identified as apparent trend. Apparent trend indicators can be recorded when taking data at range studies sites and when preparing use maps as part of short term monitoring. Appendix Number 6 (Page 45) covers soil and vegetation trend indicators.

Phenology -

Plant phenology is the study of the plant's life cycle, i.e., leaf emergence, flowering, and seed ripe, in relation to seasonal climatic factors. Because the time of occurrence of phenological events is to a large degree controlled by the weather, plants can be used as indicators of climatic differences. Phenological data are helpful for understanding monitoring observations and measurements.

Fire -

When fires occur on rangelands, management plans should be adjusted accordingly. Monitoring should recognize this influence and document where, when, and the effects of fire for planning and implementing needed changes.

Photography -

Photographs, either ground or aerial, can document conditions in both short and long term monitoring. During use mapping, photographs may be taken to show utilization levels at certain locations. Each vegetation trend transect should be used as a photo point location. Both a landscape and a close-up photograph should be taken each time the transect is sampled. One useful procedure is to take panoramic color prints of the vegetation facing the same direction as the baseline for a given transect. Various films, cameras, and formats can be used. Prints from 35mm film with a normal or wide angle lens have proven to be very useful for trend assessment.

Also, large scale (1:1,000 or larger) vertical color aerial photographs in either 35 or 70mm format provide considerable information relative to vegetation change if properly interpreted. Stereo coverage is desirable.

Insects, Disease, and Rodents -

All range vegetation is subject to disease and insect and rodent use. Monitoring records should include notes on their occurrence and impacts. The placement of monitoring studies in areas impacted by insects, disease and rodents should be avoided unless it is a special study area.

Ground Cover -

In long term monitoring, it is sometimes desirable to measure the percent bare ground, litter, rock, and basal cover of live vegetation, which may include cryptogams, at study sites. These cover characteristics can be determined in conjunction with frequency sampling by recording "hits" at marked points on the frequency frame. However, this sampling intensity does not provide an adequate measure of basal cover of individual plant species and conclusions about basal area should not be made.

Change in ground cover is an important aspect of trend. It is very useful for establishing planning objectives. It is also used to determine if favorable or unfavorable conditions exist for germination and establishment of new plants, and to estimate nutrient cycling. Appendix Number 6 (Page 45) further describes a procedure for obtaining ground cover data.

Exclosures and Comparison Areas -

Exclosures are customarily used for visual observation and studies to compare vegetation change under grazed and ungrazed conditions.

Comparison areas are locations where the natural plant community has been protected from abnormal disturbances and physical site deterioration but exposed to natural disturbances such as drought, wildfire, insects, and grazing by native fauna. Comparison areas are used, along with other methods, to determine the composition and production that a particular ecological site is capable of producing in the potential natural community. They are helpful as a gauge or standard of measurement when monitoring ecological status and trend. The history and location of these areas should be documented.

Examples of comparison areas may include:

1. Areas protected from domestic livestock grazing because of inaccessibility or lack of water.
2. Pastures with high ecological status.
3. Large exclosures, highway or railroad rights-of-way, old cemeteries, or other areas that have been protected from livestock grazing for several years. (These areas can give useful information, but they can also be misleading because of the effects of local micro-environment, weather conditions, past disturbances, or vegetation stagnation.)

SPECIAL STUDIES

An allotment or pasture may have special resource values with specific management objectives identified in the resource plan. Examples are fisheries, archeological sites, and critical habitats. When specific objectives are developed for these types of resources in a resource plan, special studies may be required. The design of these studies would be determined by the nature of the resource and objectives. Examples of special studies are the measurement of changes in streambed morphology, water quality, surface conditions of archeological sites, or cover and browse characteristics on winter range. Procedures for conducting these studies are beyond the scope of this document.

Appendix Number 1: Procedures for Selecting Key Management Areas and Key Species

Key Management Areas

Monitoring studies on a key area should be confined within the boundary of a single ecological site. The Key Management Area Location Form which follows this appendix is an example for recording the location and specific selection criteria.

A key management area should:

1. Be located where the ecological situation is well understood.

2. Be selected on the basis of the objective(s) of management planning. The attributes of the objective(s) monitored must be present on the area selected.

3. Provide a significant amount, but not necessarily the greatest amount, of available forage in the pasture. This can be ascertained from an evaluation of the utilization and ecological site maps, together with an on-site examination carried out by the technician and the livestock operator.

4. Be accessible to grazing animals because of favorable factors influencing livestock distribution. Small areas of natural concentration such as those immediately adjacent to water, salt, roads, trails, or shade usually are not suitable key management areas. Areas remote from water or having limited accessibility may be suitable for comparison areas but should not be considered as key management areas.

5. Be representative of the suitable seasonal range area. Two or more may be needed for large pastures, pastures that have very rough topography or widely spaced water, where animals tend to "locate," where different kinds of animals graze, or where the pasture is grazed at different seasons. One key management area may represent more than one pasture if they are in the same grazing system with similar treatments.

6. Be selected only after a careful evaluation of the current pattern of grazing use.

7. Be changed when the pattern of grazing use is significantly modified because of a difference in season of use, kinds or classes of grazing animals, pasture size, water supplies, or other factors affecting grazing distribution.

Critical management areas are those key areas which must be treated with special consideration because of inherent site factors, size, location, conditions, values, or significant potential conflicts among uses. It may be important to designate critical areas as key areas because they have significant resource value or concern. They may not be extensive in area or reflect the management of the entire grazing unit.

Critical management areas may include:

1. Critical habitat for wildlife.

2. Areas having threatened or endangered species.

3. Highly erodible areas.

4. Riparian areas.

Key Species

These are forage species that indicate the degree of use of associated species, or they are species which must, because of their importance, be considered in the management program.

Key species should generally:

1. Be palatable to the grazing animals during the planned season of use. (Very palatable plants that have low production potential should not be selected as key species.)

2. Provide more than 15 percent of the available forage in the grazing area. A species providing less than 15 percent of the available forage can be selected if it has a potential for greater production or if it is critical to the needs of the grazing animals. A desirable browse species on deer winter range is an example.

3. Be perennial except on annual rangelands.

4. Be consistent with the management objectives for the plant community. If the objective is to maintain or improve the plant community to a relatively high ecological status, the key species should be one that is a major component of the potential natural plant community. The species selected should be one that responds to grazing management.

5. Be selected after:

    a. Choosing the key management area and evaluating the present plant community.

    b. Deciding the plant community or seral stage that will be the goal for management of the grazing unit.

    c. Giving due consideration to planned kinds and classes of grazing animals and season of use.

    d. Thoroughly evaluating the factors affecting grazing distribution. If only one kind of animal grazes the pasture, a single plant species generally will suffice as the key species.

UNITED STATES
DEPAPTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

KEY MANAGEMENT AREA LOCATION

DISTRICT: STATE:

RESOURCE AREA

DATE ESTABLISHED

ESTABLISHED BY *(NAME)*

ALLOTMENT NAME: NUMBER:

WILDLIFE SEASON OF USE:

BIG GAME RANGE NAME:

KEY MANAGEMENT AREA NO./NAME	KEY SPECIES			
	1	2	3	4
LOCATION	TOWNSHIP	RANGE	SECTION ¼, ¼	
ELEVATION	SLOPE	EXPOSURE	VEGETATION TYPE/RANGE SITE	
TYPES OF STUDIES ESTABLISHED			AERIAL PHOTO/MAP REFERENCE	

SITE LOCATION SELECTION CRITERIA NARRATIVE:

SITE LOCATION MAP AND NARRATIVE: STATE WITNESS POST LOCATION AND BEARING FROM KNOWN LANDMARK, ALSO APPROXIMATE SCALE.

Appendix Number 2: Ecological Status

Ecological Status

When determining the initial ecological status or seral stage for a key area, the procedure can vary depending on the issues and management objectives for the area being monitored. It can range from directly estimating the species composition by weight to conducting a 10-30 plot weight estimate transect. The weight estimate transect method of determining the initial seral stage of an ecological site would be employed in areas where the issues and management objectives dictate the need for a more intensive technique. The SCS double sampling technique and BLM's weight estimate vegetation inventory method are both suitable techniques. At the time a clip and weigh transect is conducted, the observer should visually estimate the total production and percent composition of the existing community. After the transect data is collected, a preliminary comparison should be made with the visual estimate information. If they are significantly different, the observer should decide whether to adjust the estimate or review and revise the actual transect layout and results. This serves as a quality control step to help ensure that the transect is a representative sample of the vegetative community. In some cases, because of manpower constraints or noncritical resource values, the determination of ecological status may not be warranted.

Ecological site descriptions are developed for each site and are used as guides to determine ecological status. They identify the potential natural community characteristic of the site and include a list of the major plant species by percentage of the total production or expressed as pounds per acre. They are available through the local or state SCS and BLM offices.

Ideally, the measurement of vegetation production should be conducted when the key species are at full growth. However, because of planned use and time and manpower constraints, this is not always possible. The following procedure is suggested for adjusting air dry weights to peak average annual production: Determine and record the actual weights collected for each plot. Adjust utilization to zero on each individual plot. Using the percent air-dry weights determined when recording data at the transect and standardized phenological adjustment factors, adjust the production to the average annual production--then use the production amounts arrived at to determine the percent composition by weight and compare this to the potential natural plant community for placement into the seral stage.

When selecting and using a particular technique, it is necessary to:

1. Document the method used so it can be repeated at a later date.
2. Confine the weight estimate transects within the boundaries of ecological sites.
3. Document the location of the transect on an aerial photo, map, and/or by narrative.
4. Be trained in and follow the procedure selected.

When directly estimating species composition, refer to the Soil Conservation Service (SCS) National Range Handbook and the Forest Service Range Analysis Handbook for recommended methods. An example of the field forms used by the Bureau of Land Management (BLM) in Nevada follows this appendix.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ECOLOGICAL STATUS WRITE-UP

		Composition by Weight		
	Species Name or Symbol	present	*PNC	allowable
% Grass				
% Forbs				
% Shrubs & Trees				

(1) Allotment: ______
(2) Examiner(s): ______
(3) Write-up no. ______
(4) Map unit no. ______
(5) Ecological Site: ______
(6) Date: ______
(7) Quad or Phto. no. ______
(8) Soil series: ______

REMARKS: plant vigor; animal signs (hedging, terracing, droppings, etc.); severe erosion signs; % surface rock; burned/unburned; seedlings; seeded; PJ invasion; etc.

(9)	SSF
SM	(14)
SL	(14)
SR	(14)
P	(14)
FP	(15)
R	(14)
G	(15)
TOTAL	

(10) Veg. aspect: ______
(11) Slope aspect: ______
(12) % Slope: ______
(13) % Rock outcrop: ______
(14) Total lbs./Ac.: ______
(15) Gr-F-S canopy cover: ______
(16) Tree canopy cover: ______
(17) % of SWA: ______
(18) Elevation: ______
(19) Final SWA no.: ______
(20) Stratum no.: ______
(21) Key management area no.: ______
(22) Ecological Status: ______

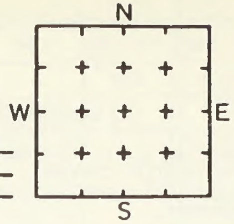
*PNC - Potential Natural Community

NV 4400-13 (July 1984)

SCS RANGE 417
REV 1-1-75

PRODUCTION AND COMPOSITION RECORD FOR NATIVE GRAZING LANDS

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SEC________
TWP________
RNG________

DATE________ COUNTY________ STATE________ LOCATION________

DATA BY________

	SAMPLE NUMBER				DATE	MAJOR LAND RESOURCE AREA		LAND SURVEY			N. LATITUDE			W. LONGITUDE			SOIL SURVEY SAMPLE NUMBER		CARD ID.
	ID NO.	YR	ST.	CNTY		NUMBER	SUBDIV.	S	TWP	RNG	DEG	MIN	SEC	DEG	MIN	SEC			
LOCATION																			

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

	KIND OF LAND	USE HISTORY	KIND OF ANIMAL	SEASON OF USE	SITE COND	BURNING	BRUSH MANGT.	ELEV	EXPOS	SLOPE	PRECIP	GROW SEASON	CRYPT	CARD ID.
SITE														

10 20 30 40 50 60 70 80

	SOIL TAXON			DETAILED PROFILE DESCRIP.		CARD ID.
	SOIL SERIES NAME	MODIFIER	TEXTURE	Y or N		
SOIL						

10 20 30 40 50 60 70 80

	WEIGHT	MEAS.	PLOT SIZE & SHAPE	CONV. FACT.	CLIPPED PLOTS	CANOPY	OVERSTORY SPECIES	DETAILED OVER-STORY DESCRIP. Y or N	TOTAL NO. OF PLOTS SAMPLED	CARD ID.
MEASURE										
REMARKS 1										
REMARKS 2										
REMARKS 3										

NOTES: Cooperator- SWCD- Field Office- Area-

Vegetation Type (Kuchler)- Site Name- Site Number-

Soil Classification (Subgroup & Family)-

Current Season Precipitation- Vigor-

CODES TO BE USED ON SCS-RANGE-417

refer to Section 700-National Range Handbook for detailed instructions.

Location Data Line

Sample Number:
ID No.--enter number, one to three digit (1-999)
Yr--enter last two digits of the year
St and Cnty--enter FIPS numerical code for state and county (same as timekeeping code numbers).

Date: enter month and day in numeric form (1102 = November 2)

MLRA: enter number and subdivision, if any.

Land Survey: enter location to the Section, Township and Range as shown on 1:250,000 USGS Quad Maps.

N. Latitude-W. Longitude: enter latitude and longitude, rounded to show probable accuracy. This coordinate system must be used if Land Survey system -above- is not used.

Site Data Line

Kind of Land: enter code from following
1--Rangeland
2--Grazable woodland
3--Native pasture
4--Rangeland-formerly cultivated
5--Grazable Woodland-formerly cultivated
6--Nongrazable woodland-understory

Use History: enter code from following
1--None or slightly grazed
2--Properly grazed
3--Overgrazed
4--Harvested for hay
---(dash)-history unknown

Kind of Animal: enter codes (up to 5 letters) to indicate kinds of grazing animals. List dominant first.
A--antelope
B--bison
C--cattle
D--deer
E--elk
G--goats
H--horses and mules
S--sheep
O--other
---(dash)-history unknown

Season of use: enter code from following (up to 4 digits)
---(dash)-unknown
1--spring
2--summer
3--Fall
4--winter
5--specialized system
0--not grazed

Site Condition: (for rangeland only) % comp.-that is climax or potential. Dash for Grazable Woodland or Native Pasture.

Burning: enter code from following
---(dash)-unknown
1--rarely, if ever, burned
2--occasionally burned
3--systematically burned

Brush Management: enter code from following
---(dash)-unknown
1--none
2--within past year
3--within past 5 years
4--within past 10 years
5--more than 10 years ago

Elev: enter rounded to the nearest 100 feet

Expos: enter dominant exposure from following code
NW--northwest
N --north
NE--northeast
E --east
SE--southeast
S --south
SW--southwest
W --west
NS--not significant

Slope: enter slope to nearest 1%

Precip: enter average annual precipitation to the nearest whole inch.

Growing Season: rate growing season from following code
1--unusually good
2--above average
3--average
4--below average
5--unusually poor

Crypt: code cryptogam cover as follows
High Med. Low

Soil Data Line

Soil Series Name: enter full name

Texture, modifier: enter code below, if applicable

BY	bouldery		
BYV	very bouldery		
CB	cobbly	GRV	very gravelly
CBV	very cobbly	MK	mucky
CN	channery	PT	Peaty
CNV	very channery	SH	shaley
CR	cherty	ST	stony or
CRV	very cherty	STV	very stony
CY	cindery	STX	extremely stony
CYV	very cindery	SY	slaty
FL	flaggy		
FLV	very flaggy		
GR	gravelly		

Texture, type: enter code from below

G	gravel	VFSL	very fine sandy loam
S	sand	L	loam
CØS	coarse sand	SIL	silt loam
FS	fine sand	SI	silt
VFS	very fine sand	SCL	sandy clay loam
LCØS	loamy coarse sand	CL	clay loam
LS	loamy sand	SICL	silty clay loam
LFS	loamy fine sand	SC	sandy clay
LVFS	loamy very fine sand	C	clay
CØSL	coarse sandy loam	SIC	silty clay
SL	sandy loam	MUCK	muck
FSL	fine sandy loam	PEAT	peat
		MPT	mucky peat

Detailed Profile Description: enter Y, if complete and suitable description available; N, if not so.

Measure Data Line

Weight: enter appropriate code for plot weights
1--fresh (green) weights
2--air-dry weights
3-oven dry weights

Meas: enter code for measurement system used
M--metric system (kg/hectare or gm/m)
E--English system (pounds/acre)

Plot size and shape: enter plot size in total area per plot (sq ft or sq m) and shape by the following code. Convert acres to sq ft.
C--circular
S--square
R--rectangular

if only one plot size and shape used enter on right half of block; if two plot sizes used, enter one on left half of data block and one on right half.

Conv Fact: enter conversion factor to convert grams per plot to pounds per acre or kilograms per hectare. Follow instructions in range handbook. Leave blank, if values in plot columns are shown as pounds per acre or kilograms/hectare.

Clipped Plots: enter no. of all plots clipped. Show plot 10 as 0 (zero). Enter dash if no plots clipped.

Canopy: enter estimated percent shaded ground at midday, if applicable. Enter dash, if not applicable.

Detailed Overstory Description: enter Y if detailed information was taken; N, if not so.

Remarks Lines

Remarks: enter essential remarks only. If detailed overstory information recorded, identify plot number. Print letters between tick marks.

CHECKED BY- DATE FORWARDED- DATA IDENTIFICATION- CARD ID.-

	KEY PUNCH CONTROL																	(COL. 76-80)		
	1-6	7-12	13-17	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62		63-67	68-72		73-75			
PLANT NAME	PLANT SYMBOL	PLANT CHAR.	ESTIMATED OR CLIPPED WEIGHT PER SPECIES (CIRCLE PLOTS THAT ARE CLIPPED)										WT CLIPPED PLOTS			PCF	% DRY WT	WT ALL PLOTS	AVG YIELD	PCT COMP
													EST	CLIP	DRY					
(1)	(2)	(3)	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
COMPOSITION TOTALS																				
RESIDUES	MULCH																			
% COVERAGE	C0VER																			
% BARE GROUND	BARE																			
% ROCK COVER	R0CK																			

INSTRUCTIONS AND CODES FOR ENTRIES ABOVE

Plant name (column 1): enter the scientific name of each species on any or all plots.

Plant symbol (column 2): enter from national list of scientific plant names. For groups of species use the following codes.

PPGG -Other perennial grasses
AAGG -Other annual grasses
PPFF -Other perennial forbs
AAFF -Other annual forbs
PPGL -Other perennial grass-likes
AAGL -Other annual grass-likes
HHSS -Other half-shrubs
SSSS -Other shrubs
TTTT -Other trees
UUUU -Unknown

Plant Char (column 3): enter the appropriate plant characteristic symbol for each species from NLSPN. (follow special instructions in range handbook.)

Plots (columns P-1 through P-10): enter weight in grams per species or group or pounds per acre or kilograms per hectare. Show trace amounts of species by entering a "T" in the plots where trace occurs (see special instructions in range handbook).

Wt. Clipped Plots (columns 4,5 and 6): columns to be completed if "double sampling" procedures are used for data collection.

Est (column 4): enter total estimated weight by species for all clipped plots. Not for computer processing.

Clip (column 5): enter total harvested weight by species from plots that are clipped.

Dry (column 6): enter the actual total air-dry weight of all species from plots that are clipped. Use only if clipped material is air dried.

PCF (5÷4) (column 7): plot correction factor obtained by dividing column 5 by column 4. Not for computer processing.

% Dry Wt (column 8): enter the percent dry weight used to convert fresh weight to air-dry weight.

Wt all plots (column 9): enter the total weight for each species from all plots. Not for computer processing.

Avg Yield and PCT COMP (columns 10 and 11): Compute as air dry weight in pounds per acre or kilograms per hectare. Not for computer processing.

Residues (Mulch): enter weight of mulch in each plot. Use same sampling techniques as for species; if "double plot" technique, gather and weigh mulch in clipped plots.

% cover (cover): Estimate and enter crown cover up to 4½ feet above ground.

% bareground (bare): estimate and enter percent of area in each plot that has bare soil exposed, do not include area covered by mulch or stones.

% rock cover (rock): estimate and enter for each plot the percent of area covered by rock, stones or gravel.

Appendix Number 3: Use Mapping, Key Forage Plant Utilization and Allowable Use

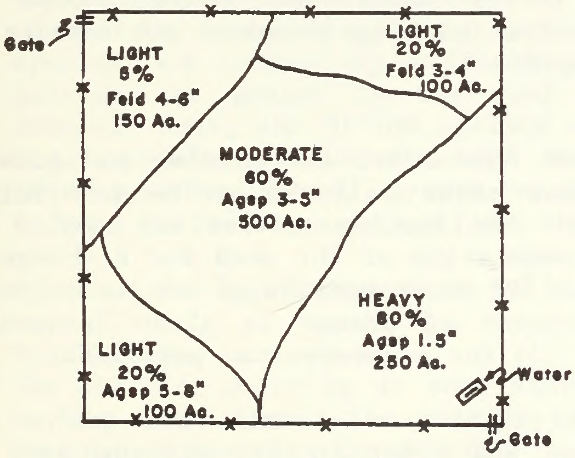
Use Mapping 1/

If zones are to be mapped within a range pasture, the differentiating charactereristics for classes (light, moderate, heavy) 2/ should be used to show the degree of use on key forage species. Use classes and an approach to judging the degree of utilization are discussed under Key Forage Plant Utilization in this appendix.

The best kind of base map for delineation of use zones is an aerial photo or orthophotoquad showing ecological sites and physical features such as fences, water, and roads. Other kinds of maps, including rough sketches (see sample) and topographic maps, can be used. The mapping procedure involves traversing the pasture to obtain a general concept of how the vegetation has been utilized and the pattern of this utilization. Features such as topography, rockiness, ecological sites, vegetative types, and distance from water affect grazing patterns. They are helpful in denoting the extent of use zones and mapping their boundaries.

Mapping proceeds as the pasture is traversed. When another use zone is observed, the name of the new use class and approximate boundary of the zone is recorded on the map together with the other information. Other information that should be recorded for each traversed use zone includes name(s) or symbol(s) of the key and other important species grazed, average stubble left, and average percentage of utilization.

Further traversing extends boundaries of use zones until the entire pasture has been observed, then the approximate number of acres within each use zone is recorded on the map as illustrated.



Legend:

Light = use class

60% = percent of use of key species

Agsp 3-5" = key species - stubble left

300 ac. = size of use zone

Sketch map of a 900 acre pasture illustrating a typical pattern of utilization as represented by use zones and data recorded during the management check.

1/ Material on use mapping is adapted from: Anderson, E. William and Currier, Wilbur F. 1973. Evaluating zones of utilization. J. Range Management 26(2):87-91.

2/ For use mapping, the none, slight, and light classes used in key forage plant utilization are combined as light, and the heavy and severe classes are combined as heavy.

Periodic management checks made while "riding" during the grazing period are beneficial for observing use zones as they develop.

The standard time for use mapping and utilization measurement should be at the end of the growing season or the end of the grazing season, whichever occurs later. Depending on management objectives, it may be desirable to observe utilization during the grazing period. This timing would indicate the amount of use at a particular time due to a certain stocking rate and mix of animals. It would show the cumulative effect of grazing on the plants to that time through a sequence of growth stages. It could give early indications of livestock distribution problems and could separate use made by different classes or types of grazing animals at different times during the grazing season. It may be advantageous to map use by wildlife or wild horses and burros just prior to livestock turn in.

On some kinds of range, the herbage produced consists of a wide variety of species having approximately equal forage value for the kinds of grazing animals and season of use involved. Under these conditions, the significance of key forage species is reduced, and it is practical to judge degree of use on the basis of a mass of vegetation rather than on a key species. For example, safe degree-of-use of mountain meadow sites could be represented by an average use recorded on the portion of the plant community that produces the bulk of the forage.

Use patterns usually do not vary significantly from year to year unless there has been some modification in the number or days of use by animals, season of use, location of waters, fences, salt, etc. or unusual weather. It may not be necessary to map use every year unless a management change has occurred. However, a record of yearly inspection tours should be maintained. Use mapping is essential for tracking progress and impacts of range improvements and management changes.

Key Forage Plant Utilization

Key forage plant utilization checks are done after the grazing and growing period, unless monitoring or management plans call for different timing. They are tied to key management areas. Utilization studies are used: (1) to supplement use maps for further documentation of the need for a change in livestock use, (2) at trend study sites for documentation of use in order to properly interpret the meaning and causes of change in plant frequency, ground cover or ecological status, and (3) for demonstration purposes.

Description of Use Classes: The six utilization classes that follow are used with the key forage plant method and refer to the percent used by weight of the key species.

1. No Use (0%): The rangeland shows no evidence of use by grazing animals.

2. Slight (1-20%): The rangeland has the appearance of very light grazing. The key herbaceous forage plants may be topped or slightly used. Current seedstalks and young plants of key herbaceous species are little disturbed. The available leaders of key browse plants are little disturbed.

3. Light (21-40%): The rangeland may be topped, skimmed, or grazed in patches. The low value herbaceous plants are ungrazed, and 60-80 percent of the number of current seedstalks of key herbaceous plants remain intact. Most young plants of key species are undamaged. There is little or no use of low value plants. There is obvious evidence of leader use. The available leaders appear cropped or browsed in patches, and 21-40 percent of the available leader growth of the key browse plants has been removed.

4. Moderate (41-60%): The rangeland appears entirely covered as uniformly as natural features and facilities will allow. Fifteen to 25 percent of the number of current seedstalks of key herbaceous species remain intact. No more than 10 percent of the number of low value herbaceous forage plants are utilized. Browse plants appear rather uniformly utilized, and 41-60 percent of the available leader growth of key browse plants has been removed.

5. Heavy (61-80%): The rangeland has the appearance of complete search. Key herbaceous species are almost completely utilized with less than 10 percent of the current seedstalks remaining. Shoots of rhizomatous grasses are missing. More than 10 percent of the number of low value herbaceous forage plants has been utilized. The preferred browse plants are hedged, and some plant clumps may be slightly broken. Nearly all available leaders are used, and few terminal buds remain on key browse plants. Approximately 61-80 percent of the available leader growth of the key browse plants has been removed.

6. Severe (81-100%): The rangeland has a mown appearance, and there are indications of repeated coverage. There is no evidence of reproduction of current seedstalks of key herbaceous species. Key herbaceous forage species are completely utilized. The remaining stubble of preferred grasses are grazed to the soil surface. There is no evidence of terminal buds, and 81-100 percent of available leader growth on the key browse plants has been removed. Some, and often much, of the second and third previous years' growth on the browse plants has been utilized. Hedging is readily apparent, and the browse plants are frequently broken.

Field Method for Key Forage Plant Utilization

1. Establishing a transect -

   The starting point is at some known reference marker that is documented on the field form. The witness post for the frequency transect should be used as the starting point.

   The transect direction is set by compass bearing and documented. The direction should be set so that the entire transect will remain within the ecological site selected as a key area.

   It is important to document the location, starting point, and direction of the utilization transect so that future utilization studies will be conducted in the same area.

2. Utilization transect observations -
   Start at the beginning of the transect and make utilization observations at predetermined intervals along the transect. Observation intervals should be specified on the field form. A good observation interval is five paces but may vary depending on the type and/or size of the key area. At each observation point, utilization of the nearest plant(s) of each key species within a 180 degree arc five feet from the toe of the boot is recorded using six utilization classes.

If the key species are not present in the arc, move to the nearest key plant along the transect. The next interval will be measured from this new point. There should be a minimum of 10 hits on every key species along the transect. The actual number of hits to be obtained will depend upon topography, the variability of the vegetation, and the best judgment of the examiner (often 20-40 points will be observed before there are 10 hits on each key species).

Allowable Use

Allowable use is the degree of utilization considered desirable, given our best understanding of proper use, and attainable on various parts of the range or allotment considering the present nature and condition of the resource, management objectives, and level of management. Proper use is a degree of utilization of current year's growth which, if continued, will maintain or improve the long term productivity of the site. Proper use varies with season, the ecological site, the physiological requirement of the plant species, and other factors.

Determination of allowable use is part of the planning process. Local specifications for acceptable degree of use should be based upon research data and on the experience of the manager and range user.

The degree of allowable use identified for a key species for one or more years serves as a guideline or reference point to evaluate the impacts grazing may be having on the overall welfare of the plant community. In monitoring degrees of utilization, the primary concern is the trend in the plant community resulting from various levels of use.

The following degrees of allowable use were developed for use as a set of definitive criteria to assist in managing rangeland vegetation on a sustained yeild basis. This table is meant to be used as a guideline only and should be tempered with local judgment on a case-by-case basis. For example, winterfat under an intensive management plan may be able to sustain greater than 50 percent utilization in the fall. In this case, the allowable use values would not apply. Generally, utilization should not exceed the moderate range identified in the key forage plant method.

Degree of Allowable Use 1/

Plant Category	Grazing Seasons				
	Spring	Summer	Fall	Winter	Yearlong
Annual Grasses 2/	60%	90%	90%	90%	83%
Perennial Grasses & Grasslike	50%	50%	60%	60%	55%
Annual Forbs 2/	60%	90%	90%	90%	83%
Perennial Forbs & Biennial Forbs	50%	50%	60%	60%	55%
Shrubs, Half Shrubs, & Trees	30%	50%	50%	50%	45%

1/ The degree of use was established by plant category for two reasons. The first being that the concept is relatively new, and there were not sufficient quantitative research data available at the species level. The second reason was that the actual plant species present varies from area to area and this approach allows for a more universal application and greater flexibility at the local level.

2/ When considering annuals, allow for sufficient ground cover and seed stock for the next year's production. The degree of allowable use for annuals was developed for use on ephemeral rangeland.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Range Utilization
Key Forage Plant Method

(1) District
(2) Date
(3) Observer
(4) Resource Area
(5) Allotment
(6) Operator/Allottee
(7) Field Name or No.
(8) Vegetation Type
(9) Range Site
(10) Kind(s) & Class(s) of Grazing Animal(s)
(11) Use Period
(12) Grazing Management System
(13) Transect Location/Key Area No.

(14) Use Rating of Current Year's Growth	Mid-Point (x)	Key Species		Key Species		Key Species	
		Frequency (f)	(f) X (x)	Frequency (f)	(f) X (x)	Frequency (f)	(f) X (x)
No Use (0%): The rangeland shows no evidence of use by grazing animals.							
Slight (1-20%): The rangeland has the appearance of very light grazing. The key herbaceous forage plants may be topped or slightly used. Current seedstalks and young plants of key herbaceous species are little disturbed. The available leaders of key browse plants are little disturbed.							
Light (21-40%): The rangeland may be topped, skimmed, or grazed in patches. The low value herbaceous plants are ungrazed and 60 to 80 percent of the number of current seedstalks of key herbaceous plants remain intact. Most young plants of the key species are undamaged. Little or no use of low value plants. There is obvious evidence of leader use. The available leaders appear cropped or browsed in patches and 21 to 40 percent of the available leader growth of the key browse plants has been removed.							
Moderate (41-60%): The rangeland appears entirely covered as uniformly as natural features and facilities will allow. Fifteen to 25 percent of the number of current seedstalks of key herbaceous species remain intact. No more than 10 percent of the number of low value herbaceous forage plants are utilized. Browse plants appear rather uniformly utilized and 41 to 60 percent of the available leader growth of key browse plants has been removed.							
Heavy (61-80%): The rangeland has the appearance of complete search. Key herbaceous species are almost completely utilized with less than 10 percent of the current seedstalks remaining. Shoots of rhizomatous grasses are missing. More than 10 percent of the number of low value herbaceous forage plants have been utilized. The preferred browse plants are hedged and some plant clumps may be slightly broken. Nearly all available leaders are used and few terminal buds remain on key browse plants. Approximately 61 to 80 percent of the available leader growth of the key browse plants has been removed.							
Severe (81-100%): The rangeland has a mown appearance and there are indications of repeated coverage. There is no evidence of reproduction of current seedstalks of key herbaceous species. Key herbaceous forage species are completely utilized. The remaining stubble of preferred grasses are grazed to the soil surface. There is no evidence of terminal buds and 81-100% of available leader growth on the key browse plants has been removed. Some, and often much, of the 2nd and 3rd year's growth of the browse plants has been utilized. Hedging is readily apparent, and the browse plants are more frequently broken.							
TOTAL							
Average Utilization = $\frac{\Sigma fx}{\Sigma f}$ *							

REMARKS (Use back of sheet)

* Where f = the frequency or number of observations within each class interval (f column), x = the class interval midpoint (x column), and Σ = the summation symbol.

NV 4400-12 (January 1982)

Appendix Number 4: Frequency Sampling Procedures

Frequency sampling is a rapid, objective means of evaluating the trend of range vegetation 1/. It has two important advantages over other previously used methods. One, the method is highly objective with a minimum amount of human decision involved, and two, it is relatively simple and easy to perform. Human decision is limited to whether the plant is rooted within the frame or not and to species identification.

1. Selecting the representative site-
   The most important factor in the determination of trend of range vegetation is the recognition of site potential. Successful trend evaluations are completely dependent upon an adequate synecological understanding of the range landscape.

   Trend plots must be placed in homogeneous stands representative of specific ecological sites. One must be fully aware of and understand the fact that upon placement of a trend plot, it is only representative of sites with similar potential. Trend plots often can be established within key management areas and can be incorporated with other studies.

   Certain ecological sites may be of special value on particular allotments and should be carefully evaluated for vegetation change. Other ecological sites occur infrequently or have little value as grazing types or both. These ecological sites probably will not justify intensive sampling.

2. Sampling procedures -
   A set of frequency frames of various sizes is required. Sizes ranging from 30 inches square to three inches square have been used successfully. Those frames should be lightweight but sturdy. They should be made with one open side to facilitate easy placement - a section of strap metal opposite the open side with tines placed at intervals along the strap metal and protruding into the center of the frame and parallel to the sides will provide nested frequency frames of smaller sizes. Each frame should have a three foot handle for handling ease. It is convenient to have a 30, 20, 15, 12, 10, 6, and 3 inch frame available. These different sizes can be nested easily into three tools. The 30 inch and 15 inch frames fit together. The 20 inch and 10 inch frames nest well, and the 12 inch, 6 inch, and 3 inch frames nest into one implement.

   As an alternative, the Forest Service recommends a collapsible nested frequency frame.

   The nested approach requires listing presence of all species within the smallest nested plot. Then the additional species present in the next largest plot are recorded and so on. All plots within the smaller frame are also within the larger frame. Plant size and abundance will dictate the appropriate frame size for appropriate sampling. Appropriate frame sizes for adequate sampling of typical Great Basin plant communities are found in Appendix Number 4, Table 1.

1/ Tueller, P. T., et al. 1972. Methods for measuring vegetation changes on Nevada rangelands. Nev. Agr. Exp. Sta. Tech. Bull. 16.

In addition to the frames, a 100 foot or 30m steel tape is required. A spring with a swivel on it is useful for keeping this tape tight and straight while it is in use. Surveying pins are useful for securing the baseline tape. Stakes for permanently marking the study area can be made from reinforcement bar (rebars). They should be painted a brilliant color to insure their relocation from year to year. A stake-driving hammer is necessary also.

To record the data, a clipboard and proper field forms are needed. A tally counter is useful for keeping the proper number of quadrats per transect.

Plot Layout - The first step in establishing a trend study plot using frequency sampling is laying out the baseline (Appendix Number 4, Figure 1). This line constitutes a permanent portion of the frequency trend plot. The line is established by stretching a steel tape in a representative portion of the area to be evaluated. The tape is stretched as close to the ground as possible and affixed to the ground with two surveying pins. A second steel tape stretched perpendicular to the baseline greatly facilitates easy placement of the plots, keeps the transect perpendicular, and defines the remaining side of the plot frame.

Where possible, each baseline should be placed on the contour; If the plot is to be placed on the level, then it will be oriented to the north and south. For relocation purposes, it would be good to draw a map on the back of the summary sheet that is numbered and dated correctly. The map will show roads, trails, distinguishing topographic features, trees, rocks, and related items and will be used as a means of returning to the baseline.

A rebar placed near the road at a given distance from a known point will be helpful in relocation. This rebar will then be used to measure out to and find one end of the baseline. Relocation of the baseline is of paramount importance.

The second step is to photograph the vegetation and soil at the transect location. A panoramic and a closeup photograph should be taken once the baseline is established for a given transect. This constitutes an historical record for the site and helps in later interpretation of the data. Take the panoramic or landscape photo of the vegetation from the reference stake facing in the direction of the baseline with a standard 50 mm lens. The close up photograph should be of the vegetation in a frame off one of the belt transects. This frame should be relatively close to the baseline. It is important that the frame selected contains vegetation representative of the site and its location is documented. This allows the picture to be repeated each time the transect is sampled so the frequency species data can be correlated to it.

The third step consists of selecting the appropriate frame size and the recommended sampling plans. The sample plan refers to the number of transects and number of frames per transect. Recommended sampling plans and frame sizes for representative Nevada range types are found in Appendix Number 4, Table 1.

These guides have been developed to give the best possible sample for the greatest number of species on a given ecological site. Efficiency was evaluated in terms of data variance and cost (time spent in sampling). In some instances, dual sampling using two frame sizes (nested frames), the smaller one for very abundant species, has been recommended.

Transects consist of groups of quadrats (frames within which presence or absence is determined) placed contiguously or at given intervals. We recommend contiguous placement, i.e., a belt transect. The sampler can accomplish this by keeping a mental record of the location of each corner of the frame and then placing the right hand corners where the left hand corners had been previously. This procedure will be reversed if the transect is started in the opposite direction. Transects are constructed by placing a selected number of quadrats side-by-side in a line perpendicular to the baseline (a belt transect). Each transect is originated at a random footmark along the baseline. The randomization is restricted so that half of the transects are randomized on each side of the 50 foot mark (midpoint of the baseline). When the frequency frame is placed on the ground, it forms one quadrat. When it is lifted and placed immediately adjacent to the established quadrat, a transect is started. Continuation of this procedure through 10 or 20 quadrats will constitute a transect. Once a transect is complete, the worker moves to the next random foot mark and starts again.

The presence or absence of a species is dependant upon its root location --rooted frequency. If any part of the plant is rooted inside the frame, it is counted as being present.

Reading the quadrats consists of two very simple decisions. If a plant is rooted in the quadrat and the worker can recognize the species, then its presence should be recorded. Plants which are unknown should be marked with a symbol for later identification. Careful observation of the quadrat will show the species rooted within. Only one hit per species is recorded regardless of the number of individuals occurring within the quadrat. Depending on the allotment and key area objectives, it may be necessary to collect size, age, form or vigor class for the key species. The intensity or number of species and types of data collected for them should be determined during the planning process.

Suggested field frequency data and trend summary forms are attached to these procedures. Ecological site, location, plot number, examiner, recorder, date, sample plan, frame size, interval (when appropriate), sheet number, all species, notes, etc. should be recorded. The percent frequency can be computed very simply by dividing the number of hits per species by the number of quadrats per transect.

As a rule of thumb, it is expected that all frequency percentages for important species should fall between 10 and 90 percent or, if possible, between 20 and 80 percent. This will provide the greatest possible chance of detecting an important trend for a species when the plot is read again. It has been shown that when initial frequency percentages are relatively high, say between 60 and 80 percent, smaller vegetation changes can be measured with statistical significance. Use a frame size or sizes that will produce numbers falling in these ranges for the greatest number of species. In order to successfully make trend (successional) interpretations, frequency data should be taken by size, age, form, or vigor class within key species.

To assure statistical reliability, we recommend that, when possible, 200 presence or absence frames constitute a minimum. The US Forest Service recommends 100 frames, which under many situations may be adequate, especially when the nested frequency approach is used. The Range Inventory Standardization Committee (1983) has suggested that a precision of 20 percent of the mean at a probability of 80 percent should be the minimum acceptable level of statistical reliability. It is likely that 100 frames will do this on many ecological sites although further testing will be required.

3. Statistical analysis of frequency trend data-
   A. Question that is addressed: Is the frequency of occurrence of a plant species in year one significantly different from year five, etc.? It is a yes or no answer. The cause or reason for any differences must be determined after careful analysis of all available data, i.e., utilization, actual use, climate, ecological status, grazing plan, etc.

   B. Statistical analyses that may be used with frequency data are analysis of variance and Duncan's multiple range test.

      Analysis of variance identifies whether there is a significant difference between data for individual species from two or more years. It does not say which years are different.

      Duncan's multiple range test identifies which years of data are significantly different when more than two years of data are being analyzed.

      To prepare frequency data for these analyses, calculate the percent value for each frame based upon the number of frames per belt transect. If there are a number of values above 80 or below 20 percent, then a transformation calculation on all the percentage data for a plant species or cover class should be applied to stabilize the variance and approximate a normal distribution. Transforming the percentage data validates statistical procedure assumptions and increases the sensitivity of the statistical analysis for detecting change. If the results of all the frequency or cover data fall between 30 and 70 percent, chances are a transformation calculation is not required. This is because the data approximates a normal distribution within that range. The appropriate transformation equation is of the form:

      $$\arcsin \sqrt{X} = \text{transformed value.}$$

      Where X = percent frequency

      NOTE: In both the analysis of variance and Duncan's multiple range test, standard statistical formulae are used. These formulae are available in any basic statistics text.

4. Special areas requiring trend determinations-

   The frequency technique can be adapted for use on small areas, in dense vegetation, and in grazed situations.

   When the area to be sampled is small, the sampling plan must be adapted to fit the area. This can be accomplished in several ways. The length of the baseline can be reduced from 100 feet to 50 feet, or even 25 feet. The number of quadrats per transect can be reduced from 20 to 10. A reduction in the number of quadrats per transect may be offset by an increase in the number of transects to produce an adequate sample size. In practice, it may be possible to select two similar sites in close proximity and sample half of the transects on each area.

   In dense vegetation, the quadrat size should be reduced to keep the percent occurrence in the proper limits. Experience has shown, for example, that a 10x10 inch quadrat with 5x5 inch, and 2.5x2.5 inch subdivisions is an appropriate size to use for the various species in the wet meadow range site. In a few instances, however, the frequencies of Kentucky bluegrass, redtop, and sedge were greater than 80%, even in the 2.5x2.5 inch sample. In this case, the frequency frame size may, of necessity, be reduced to the size of a point. The individual conducting the study will have to make the decision on which quadrat size to use for each species sampled. When the observer is undecided, frequency can be determined on two different sized quadrats for several transects, then the proper size selected.

   Grazing increases the difficulty of vegetation sampling in meadows and riparian sites in terms of plant identification. The best solution would be to sample in rested or deferred pastures. When this is not possible, cages can be used to protect small areas to assist in identification of important species (outside of the cages) by their vegetative characteristics.

Trend Procedure Summary

1. Place the baseline in a representative stand of an important ecological site. Make provisions for its relocation.

2. Select the appropriate frame size and recommended sample plan for the ecological site in question.

3. Read and record quadrat data for each randomly located transect.

4. Hits are recorded only when the species is rooted within the quadrat.

5. Only one hit is recorded per species and per quadrat regardless of the number of individuals occurring within the frame.

6. Record frequency percentages by species and place value on data pads ready for computation.

7. Statistically analyze data for significant species changes and interpret.

Table 1: Appropriate frame sizes and sample plans (transect-quadrat allocations) for efficient sampling of certain range plant communities in Nevada.

	Plant Community	Frame Size* Recommendation	Transect-Quadrat Allocation***
1.	Artemisia tridentata/Oryzopsis hymenoides	30"	20/20
2.	Artemisia tridentata (Seral)	16"	10/20
3.	Artemisia nova/Poa secunda	20" (10")**	20/10
4.	Artemisia arbuscula/Poa secunda/Agropyron spicatum	10"	20/10
5.	Eurotia lanata	3"	20/10
6.	Sarcobatus baileyi/Oryzopsis hymenoides	12"	20/10
7.	Chrysothamnus viscidiflorus	6"	20/10
8.	Artemisia spinescens/Artriplex confertifolia	10"	20/10
9.	Artemisia arbuscula/Bromus tectorum	24" (3")	20/10
10.	Artemisia longiloba/Poa secunda/Festuca idahoensis	24" or 30" (15")	20/20

* The length of one side of a square quadrat

** Artemisia nova only

*** The most efficient ratio of transects to quadrats

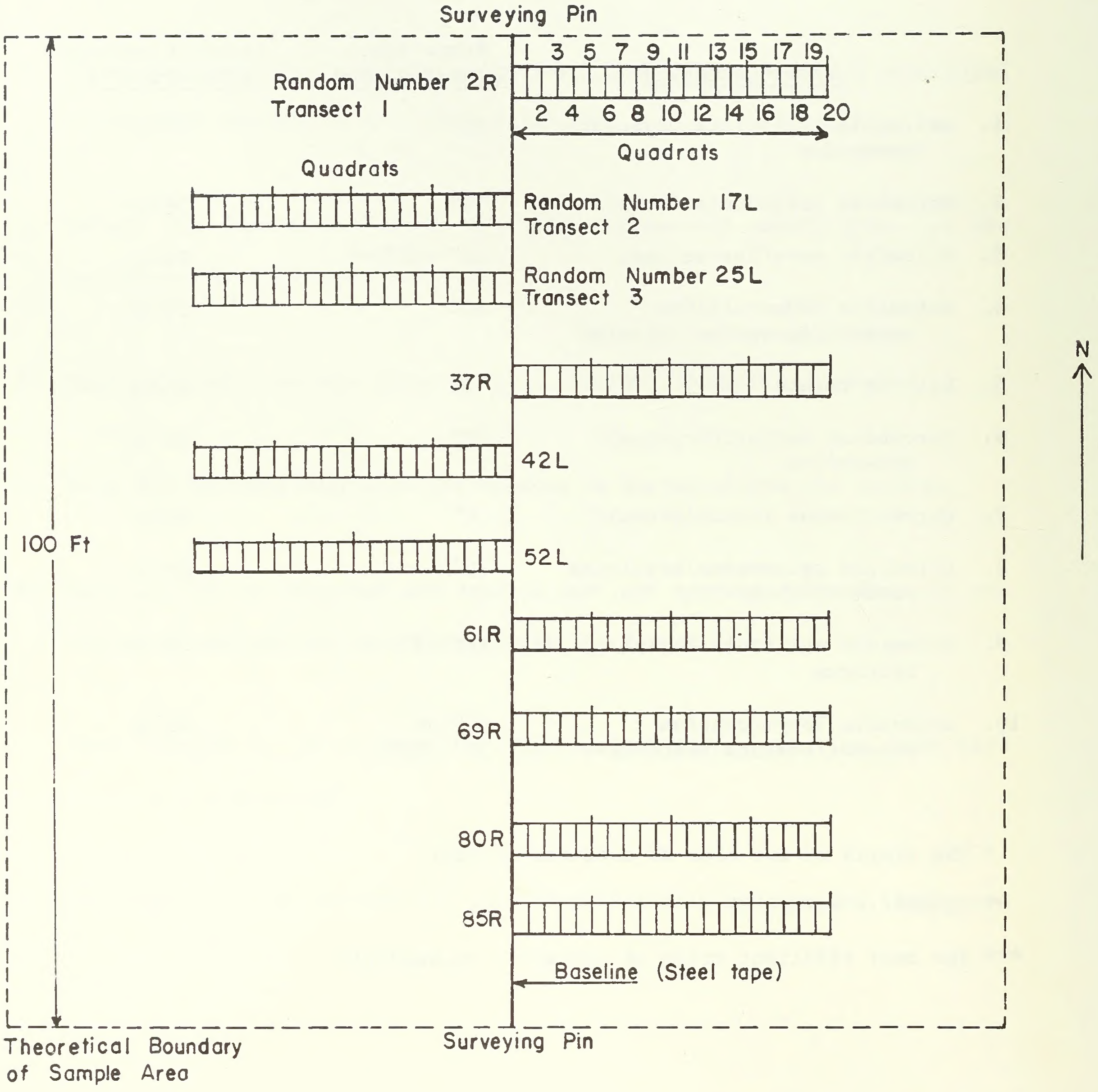


Fig. I. Schematic Outline of a Macroplot
Sample Plan = 10 Transects of 20 Quadrats (10/20)

Using 20-inch frame the outline would be to scale.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

GROUND COVER & FREQUENCY DATA

EXAMINER ______________________
DATE (YYMMDD) (1)
NO. OF TRANSECTS (2)
NO. OF QUADRAT/TRANSECT (3)
WILDLIFE SEASON OF USE (4)
BIG GAME RANGE NAME (5)

BLM ADMIN UNIT (ST/DI/RA/PU)_(6)
ALLOTMENT _ _ _ _ _ _ _ _ _ _ _(7)
PASTURE _ _ _ _ _ _ _ _ _ _ _ _(8)
KEY AREA NO./NAME _ _ _ _ _(9)
RANGE SITE (HABITAT TYPE)__(10)

RANDOM NUMBERS	TOTAL of 10		2L		17R		25R		37R		42R		52R		61R		69L		80L		85L		NO. OF HITS	% FREQ. OR COVER
	FIRST 10 of 20		2L		7R		17R		20R		25R		29R		37R		40L		42R		45L			
GROUND COVER		FRAME SIZE	1 DOT COUNT	NO	2 DOT COUNT	NO	3 DOT COUNT	NO	4 DOT COUNT	NO	5 DOT COUNT	NO	6 DOT COUNT	NO	7 DOT COUNT	NO	8 DOT COUNT	NO	9 DOT COUNT	NO.	10 DOT COUNT	NO.		
	VEGETATION																							
	BARE GROUND																							
	LITTER																							
	ROCK																							
FREQUENCY (SPECIES)																								
GRASSES																								
FORBS																								
SHRUBS																								

NV 6630-2 (JANUARY 1984)

	RANDOM NUMBERS TRANSECTS 11-20		52R		54L		61R		62L		69L		77L		80L		81R		85L		98R		NO OF HITS	% FREQ. OR COVER
	SPECIES	FRAME SIZE	11		12		13		14		15		16		17		18		19		20			
GRASSES																								
FORBS																								
SHRUBS																								

1) Data: Enter date of data collection; year, month, day.
2) No. of Transects: Enter the number of transects (10 or 20) in the sampling scheme.
3) No. of Quadrats: Enter the number of quadrats (frequency frames) established in each transect.
4) Enter the appropriate season(s) symbol. Spring, (1); Summer, (2); Fall, (3); Winter, (4); Yearlong, (5). (E.g., Spring & Summer |1|2| | | | |, leave unused blocks blank.)
5) Common herd name (e.g. Duck Creek).
6) DE 0003 BLM Admin. Unit: Enter Administrative State Code (alpha) and the District, Resource Area, and Planning Unit numbers.
7) DE 0968 Allotment: Enter designated RMAS four character number.
8) DE 0905 Pasture: Enter pasture number, blank if none; (must be unique within the allotment.
9) Key Area Number: Enter four digit key area number (e.g. 0001 to 9999); these must be non-repetitious by Resource Area. Wildlife key area name would be e.g. KDWI.
10) DE 3528 Range (Ecological) Site Number: Enter range site number according to the following example:
    D 26 A 001 ONU, where
    D - Major Land Resource Region
    26 - Major Land Resource Area
    A - Subarea (if not subarea enter "X")
    001 - Consecutive Site Number
    and ONU - States in which range site is correlated, e.g. Ore., Nev., Utah.

MISCELLANEOUS

random marks: random marks (along the 100ft. baseline) are listed for the 10 and 20 transects sampling schemes, use the random marks on the top line for the 10 transect scheme; use the random marks on the bottom line for the 20 transect scheme (plots 1-10 on the front page, 11-20 on the back page).

species: list four letter code for each species encountered and enter by life form group, grasses, forbs, shrubs; enter the size of plot frame used to sample each individual species

number of hits enter the total number of hits for each species or catigory.

%cover/frequency: equals the total hits for each species divided by 200 for frequency and 600 for cover data

3rd Approximation

Field Frequency Data Sheet

Ecological site or
Habitat type:____________________ Examiner & Recorder_______________ Date_______ Site No.______ Frame Size_____

Location____________________________ Sample Plan____________ Interval______________ Sheet No.____________

Species	Trans. No.	%	Trans. No.	%	Trans. No.	%	Trans. No.	%	Trans. No.	%	Trans. No.	%	Trans. No.	%	Trans. No.	%	Trans. No.	%	Trans. No.	%

NOTES AND SPECIES ENCOUNTERED

2nd Approximation

TREND SUMMARY

Ecological sites or

Habitat Type__________ Location __________ Site No.________

Sample Plan__________ Frame size__________ Interval________

Initial Evaluation: Yes____ No____ Change of Frame________ * Date________

Species	Percent Frequency Date____	Date____	Date____	Date____	Date____	Percent change by period	Trend Index

NOTES____________________

Appendix Number 5: Example Forms for Recording Grazing Use

A. Sample form for recording actual grazing use (from a grazing use record booklet used in the Bureau of Land Management, Winnemucca District).

Grazing Use Record

Pasture: ______________________

---------------------- For Livestock Operator's Use ----------------------

Move	Number of Livestock		
Date	Put in	Taken Out	Remarks

Grazing Use Record (SAMPLE)

Pasture: WASHOUT

---------------------- For Livestock Operator's Use ----------------------

Move	Number of Livestock		
Date	Put in	Taken Out	Remarks
4/16	43		SAW 20 ANTELOPE AT TUB SPRING
4/18	61		AIR VENT ON WASHOUT, PIPELINE BROKEN. TEMPORARILY FIXED
6/15		38	MOVED TO GRAVEL PASTURE
6/17		66	" " " "

The entries made on 6/15 and 6/17 should also appear on the Gravel Pasture page; however, the number of livestock will be entered in the "Put In" column.

SCS-RANGE-414
Rev. 10-70
File Code RANGE-16

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PROPER GRAZING USE

COOPERATOR ____________________

GRAZING UNIT	ACRES	SPECIES OF GRAZING ANIMAL	SEASON OF USE	LOCATION OF KEY GRAZING AREA	KEY PLANT(S) FOR JUDGING PROPER GRAZING USE	PLANNED USE OF KEY SPECIES AT END OF GRAZING PERIOD	ESTIMATED USE OF KEY SPECIES BY WEIGHT				
							19__	19__	19__	19__	19__
						Initials of Conservationist Assisting with Application					
						Dates of Application Checks					

Conservationist Assisting with Planning

____
NAME AND DATE

INSTRUCTIONS

PROPER GRAZING USE

Grazing Unit: Enter in this column the name of the pasture or field used by the cooperator or the number from the conservation plan map.

Acres: Enter in this column the acreage of the grazing unit.

Species of Grazing Animal: Enter in this column the species and class of livestock being grazed such as: dry cows, cows-calves, ewes and lambs, yearling cattle, 2-year steers, yearling sheep, goats, deer, horses, elk, etc.

Season of Use: Enter in this column the season that unit will be grazed such as: Fall, Winter, Spring, Summer, or by months: September-October, November-March, May-July, etc.

Location of Key Grazing Area: Enter in this column a description of the key grazing area. This may be a range site or it may be a portion of a site or it might be a particular location within the grazing unit such as: S-W portion of grazing unit starting about 200 yards from pond to fence.

Key Plant(s) for Judging Proper Grazing Use: Enter in this column the species by common name on which you and the cooperator decide proper grazing use will be judged. There may be occasion when you will select two species, in this case enter the name of both species.

Planned Use of Key Species at End of Grazing Period: Enter in this column the percent by weight of the current year's growth of the key species that should be left ungrazed at the end of the grazing season. Where specification call for a certain number of pounds of forage to be left ungrazed per acre of the key species, then, the specified pounds per acre should be entered in this column.

Estimated Use of Key Species by Weight: Enter in this column by calender year the estimate of the actual use the grazing unit received. This estimate should be based on the key species on the key grazing area, at or near the end of the grazing period or on year-long grazing just prior to the next growing season. If specification calls for use in percent of current year's growth, enter percentage of growth actually left ungrazed. If use is specified in amount of forage to be left ungrazed in pounds per acre then enter pounds per acre left ungrazed. Actual use estimates are more meaningful when made jointly by the cooperator and conservationist.

Appendix Number 6: Ground Cover and Apparent Trend

Ground Cover Measurement

The percent bare ground, rock, litter, and basal cover of live vegetation can quickly be obtained along with frequency information at sampling sites. The use of three points/frame or 600 points in a 10 transect/20 quadrat frequency sample works well. Sharpened points give a more specific sample. Statistical analyses are similar to those for frequency except that point "hits" must be converted to percent cover in a computer program for data storage and retrieval. The frequency field data form includes blanks for recording ground cover.

Apparent Trend*

General Indicators of Apparent Trend in Range Condition: Indicators of apparent trend have been divided into two groups, one indicating downward trend and the other indicating upward trend. The indicators are further classified into indicators of soil trend and indicators of trend in vegetation. It is not safe to base conclusions with reference to trend on one or two indicators unless they are especially strong. If a majority of indicators point to improvement, the trend should be judged as being upward; if a majority point to deterioration, the trend should be judged as being downward. If trend cannot be determined, the situation should be judged as not apparent.

A. Soil Indicators of Downward Trend:

1. Rill Marks. Rill marks are small active gullies, frequently of the shoestring type. They often appear during storms but may be obliterated later, depending on depth of cutting.

2. Active Gullies. These are established gullies that are raw and actively cutting. This type of gully may vary from a few inches to several feet in depth.

3. Alluvial Deposits. These are soil material transported and laid down by running water. Soil deposits may be found in depressions, behind piles of litter or debris, or at the termination of rills and gullies. Recent deposits may partially cover the basal portions of established plants. They may be distinguished from old ones by the absence of perennial vegetation on the deposit.

4. Soil Remnants. Soil remnants are portions of the original topsoil held in place by vegetation or plant roots. They may form the base of pedestaled plants. Soil pedestals carved by rocks or pebbles are usually of recent origin following storms. Steep-sided soil remnants indicate soil instability and a downward trend. Almost vertical sides are characteristic, often with exposed roots of the plants holding remnants of the soil.

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* Adapted from Forest Service Region Four "Range Analysis Handbook" July 1964.

5. Active Terraces. Active terraces are "stairstep-like" in appearance on slopes. They are produced by an accumulation of soil above clumps of vegetation and by the removal of soil from the clumps below. Terraces are usually caused by the hooves of animals. Active terraces have steep sides, show evidence of sliding soil, exposed live roots, and are not stabilized by vegetation.

6. Exposed Plant Crowns or Roots. This is soil loss taking place currently as shown by exposed crowns or roots appearing on young, deep-rooted perennial plants.

7. Wind-Scoured Depressions Between Plants. Wind removal of soil particles causes depressions in the surface of the soil. In extreme cases, the soil surface is merely a series of shallow depressions separated by low ridges of vegetation. If the surface of the depression is scoured or etched, rapid downward trend is indicated.

8. Wind Deposits. Wind deposits are formed by fine soil particles that have drifted onto the lee side of vegetation or into the vegetation itself. Recent wind deposits show little, if any, discoloration of the surface material by organic matter and no decomposition of buried parts.

B. Soil Indicators of Upward Trend:

1. Gullies Healed. These are gullies which originate on the area and are stabilized by the growth of perennial vegetation on both sides and bottom. The sidewalls will be rounded in appearance. The presence of vegetation in gully bottoms is not in itself a reliable indicator of improved range condition. It may be highly misleading if used without a careful appraisal of conditions on the area drained.

2. Sloping-Sided Soil Remnants. These are soil remnants with sloping sides, or sides clothed with mosses, lichens, or higher plants. Plant roots are covered by soil. Space between soil remnants are being occupied by perennial plants.

3. Healed Terraces. Stabilized terraces are characterized by sloping sides clothed with vegetation and no exposed live roots. Tops of terraces are invaded and occupied by perennial plants.

C. Plant Indicators of Downward Trend:

1. Better Forage Plants Unavailable to Livestock. Better forage plants may be largely confined to the protection of shrubs. Openings between shrubs may be largely occupied by unpalatable plants of various age classes.

2. Hedged and Highlined Shrubs. Dead and dying hedged plants present. Dead branches generally indicate that shrub is dying.

3. Lack of Reproduction and Young Plants of Better Species. Absence of seedlings or young plants of both palatable and unpalatable plant species may indicate that the microclimate is unfavorable for germination or seedling survival. If seedlings and young age classes of unpalatable plants are present and those of palatable plants are absent, it may be assumed that grazing is too severe for palatable plants to become established. Downward trend is indicated.

4. Invasion by Unpalatable Plants. Invasion by unpalatable or poor forage plants is an indicator of downward trend in forage value.

5. Palatable Plants Lacking in Vigor. Low vigor in plants is shown by the pale, sickly color of foliage, few seed stalks produced by grasses, shallow or scant root systems of normally deep-rooted plants, and absence of seedlings.

6. Scarcity of Litter of Palatable Plants. Litter scarce and poorly dispersed.

D. Plant Indicators of Upward Trend:

1. Better Forage Plants Invading and Readily Available to Livestock. Better forage plants growing in the openings between shrubs.

2. Invasion of Bare Spots by Better Forage Plants. Invasion must be positive, that is, a variety of age classes must be represented in addition to seedling reproduction. Better forage plants should be invading in stands of unpalatable plants or on bare ground lacking vegetation. Invasion by perennials into openings between shrubs is a good indicator of upward trend.

3. Invasion on Erosion Pavement. Invasion and establishment of perennial plants on erosion pavement is a good indication of upward trend. The basal parts of invading plants will be flush with the ground surface if soil erosion has stopped.

4. Several Years' Growth from Hedged Browse. At least two or more years' regrowth is readily established by a count of annual growth rings.

5. Palatable Plants Vigorous. Grasses robust with many leaves, seed stalks tall and numerous, leaves a healthy green color. Forage plants reproducing vigorously with a variety of age classes present.

6. A Well-Dispersed Accumulation of Litter from Past Years' Growth. Generally, a well-dispersed layer of litter accompanies a well-dispersed vegetal cover.

Field Checklist for Recording Apparent Trend Indicators:

VEGETATION:

Up or Stable	Down
1. Desirable frequency groupings and age classes of desirables, intermediates, and least desirables.	1. A disproportionate amount of intermediates and least desirables. Seedlings of better plants having having difficulty in becoming established.
2. Forage plants not being pulled up or trampled out by grazing.	2. Forage species being pulled up or trampled out by grazing.
3. Vigor of key species high as indicated by leaf length, seed stock production, and normal color.	3. Low vigor of key species as indicated by reduced size of plant, leaf length of seed stalks, and off color (sickly yellow).
4. Browse species showing no hedging.	4. Browse species showing moderate to heavy hedging.

SOIL:

Up or Stable	Down
1. Ground cover dispersion - uniform.	1. Ground cover dispersion - variable to highly variable.
2. No detectable soil movement.	2. Soil movement detectable.
3. Soil surface continuous and intact.	3. Cupping out between soil remnants.
4. No exposure of plant roots.	4. Plant roots exposed.
5. Stones and rock fragments, where present, normal and in place no movement of rock fragments.	5. Stones and rock fragments, where present, concentrating on surface as erosion pavement. Fragments loose and often moving downslope.

USDA Forest Service

APPARENT TREND RATING
(FSH 2209.21, 2.23f)

FOREST__________________ DISTRICT__________________ ALLOTMENT______________

Study Type: Study Name/Number__________________________

Site Analysis ☐ By____________________ Date______________

Trend Study ☐ By____________________ Date______________

VEGETATION

	Up or Stable			Down	
1.	Favorable frequency grouping and age classes of desirables, intermediates, and least desirables.	____	1.	A disproportionate amount of intermediates and least desirables. Seedlings of better plants having difficulty in becoming established.	____
2.	Forage plants not being pulled up or trampled out by grazing.	____	2.	Forage species being pulled up and trampled out by grazing.	____
3.	Vigor of key species high as indicated by leaf length, seed stock production, and normal color.	____	3.	Low vigor of key species as indicated by reduced size of plant, reduced leaf length, lack of seed stalks, and off color (sickly yellow).	____
4.	Browse species showing little or no hedging.	____	4.	Browse species showing heavy hedging.	____

SOIL

	Up or Stable			Down	
1.	Ground cover dispersion - uniform.	____	1.	Ground cover dispersion - variable to highly variable.	____
2.	No detectable soil movement.	____	2.	Soil movement detectable.	____
3.	Soil cover continuous and intact.	____	3.	Soil Cover broken and soil exposed.	____
4.	No exposure of plant roots.	____	4.	Plant roots exposed. 1/	____
5.	Stones and rock fragments where present, normal, and in place - no movement of rock fragments.	____	5.	Stones and rock fragments, where present, concentrating on surface as erosion pavement. Fragments loose and often moving downslope.	____
6.	Lichen lines on stones and rock fragments extend to soil level.	____	6.	Lichen lines on stones considerably above soil surface - no lichens on rock fragments.	____
7.	No active gullies.	____	7.	Active gullies - indicated by recent cutting and sloughing.	____
8.	No recent soil deposits either alluvial or aeolian.	____	8.	Recent soil deposits - alluvial or aeolian.	____
9.	No wind-scoured depressions.	____	9.	Wind-scoured depressions.	____

1/ At high elevations and on heavy soils some of this may be natural due to frost heaving.

R4-2200-25 (8/81)

Form 1279-3
(June 1984)

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